

Supplementary Information: Adjusting agricultural emissions for trade matters for climate change mitigation

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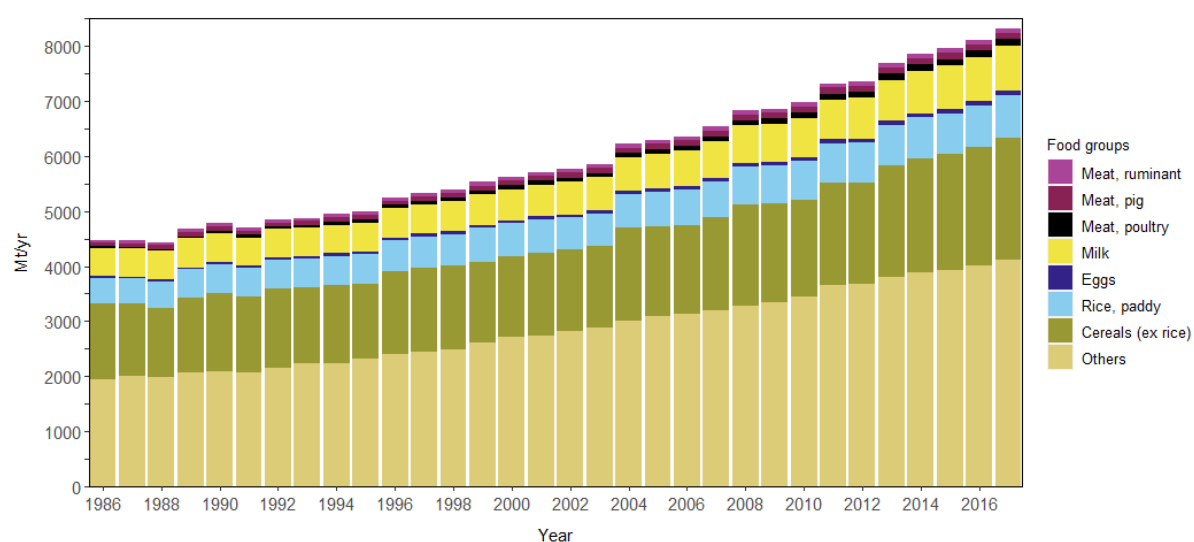
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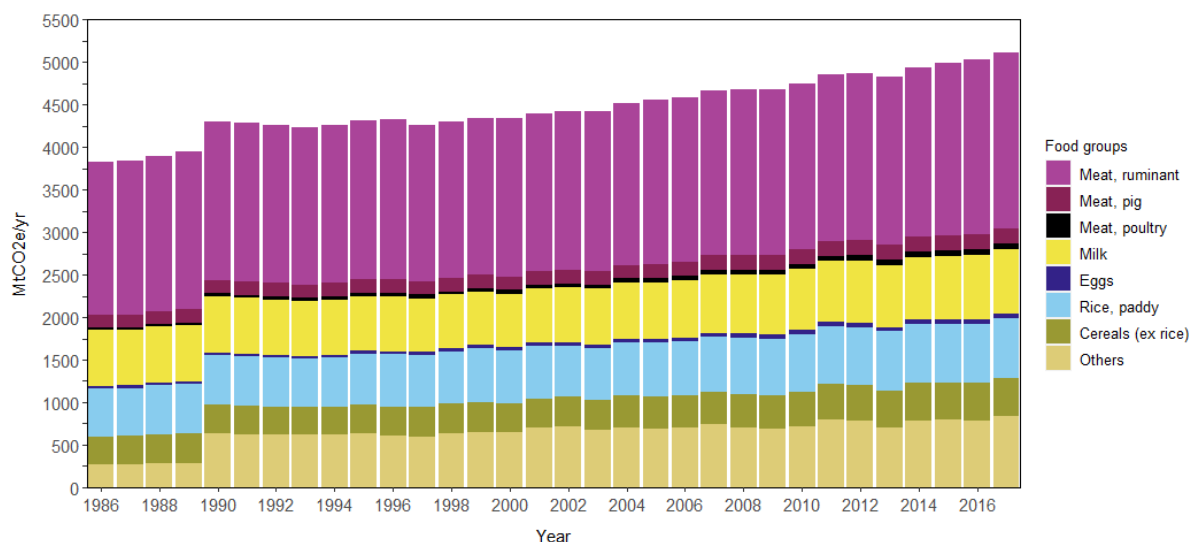
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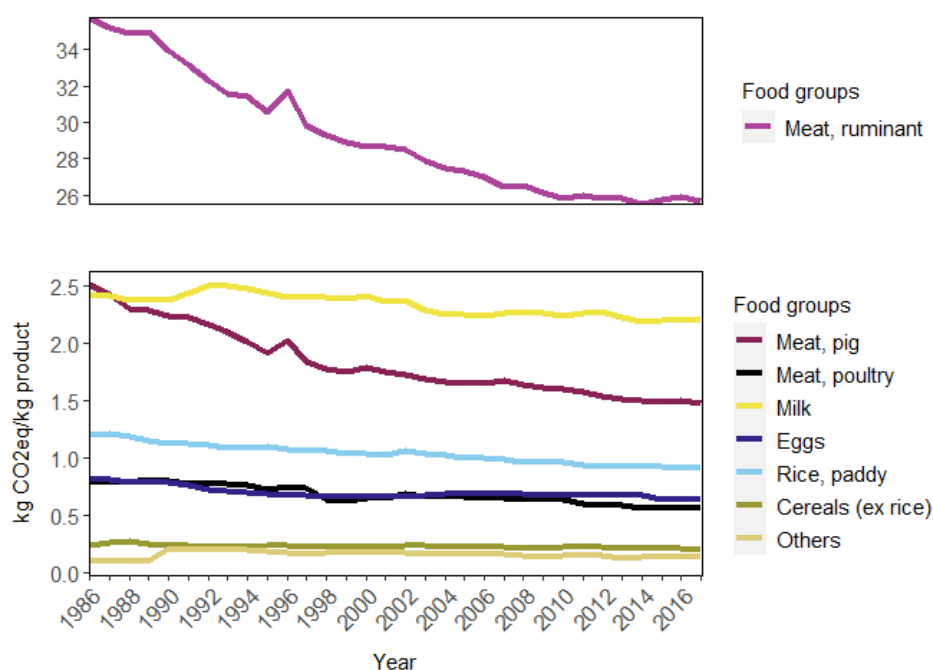
Supplementary Figures



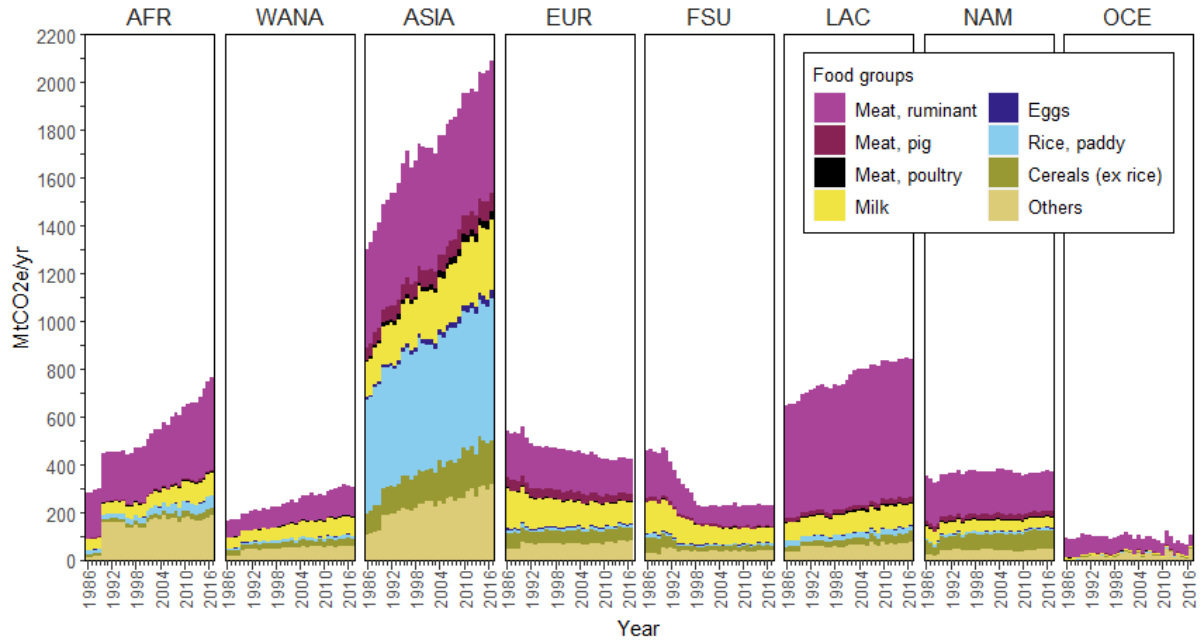
Supplementary Figure 1: Global change in agricultural production volumes from 1986 to 2017. Production volumes are broken down according to food groups. Values are shown for individual years, i.e., without averaging values for three years.



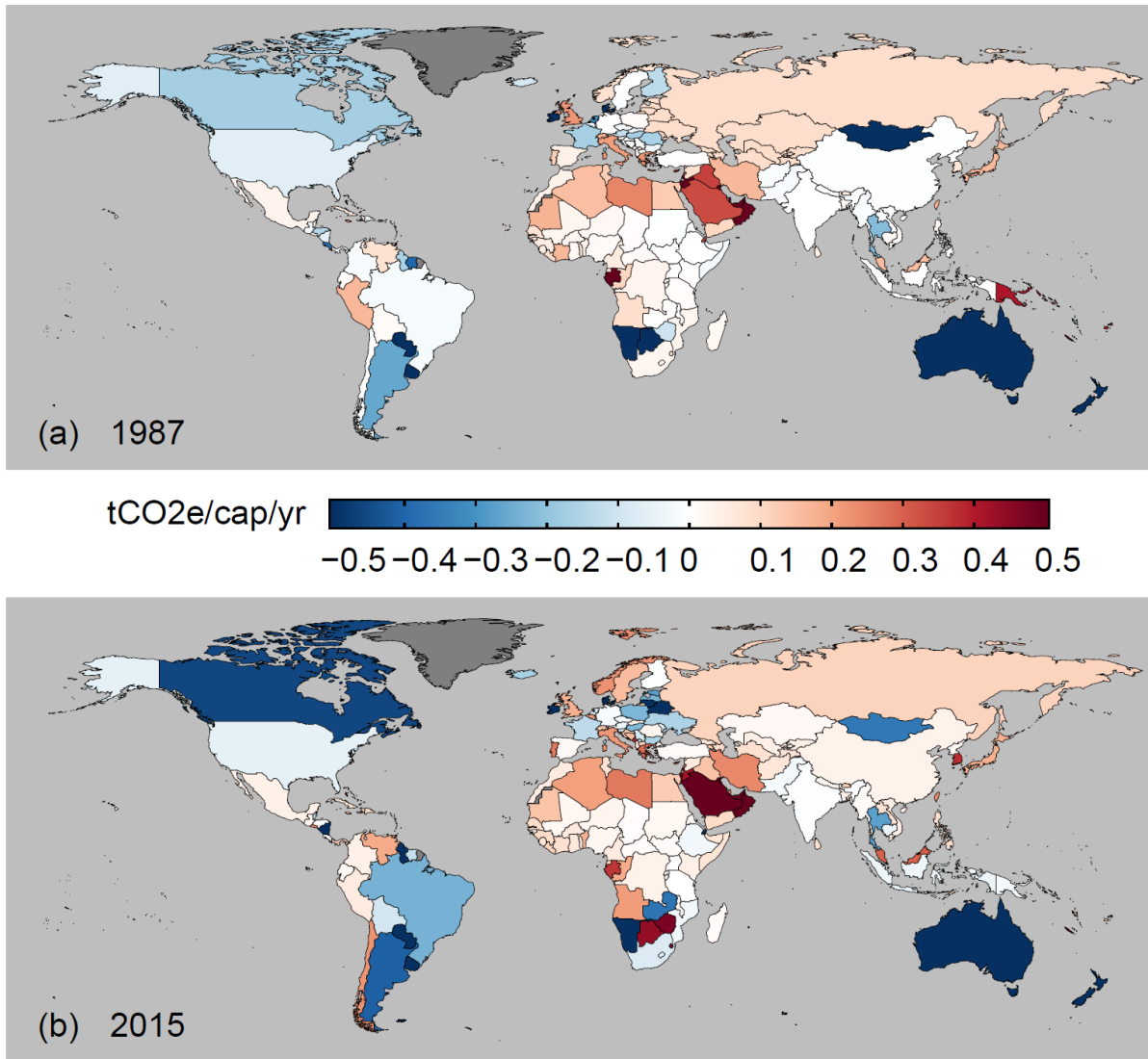
Supplementary Figure 2: Global change in production-based emissions (PBEs) from 1986 to 2017. PBEs are broken down according to food groups. Values are shown for individual years, i.e., without averaging values for three years.



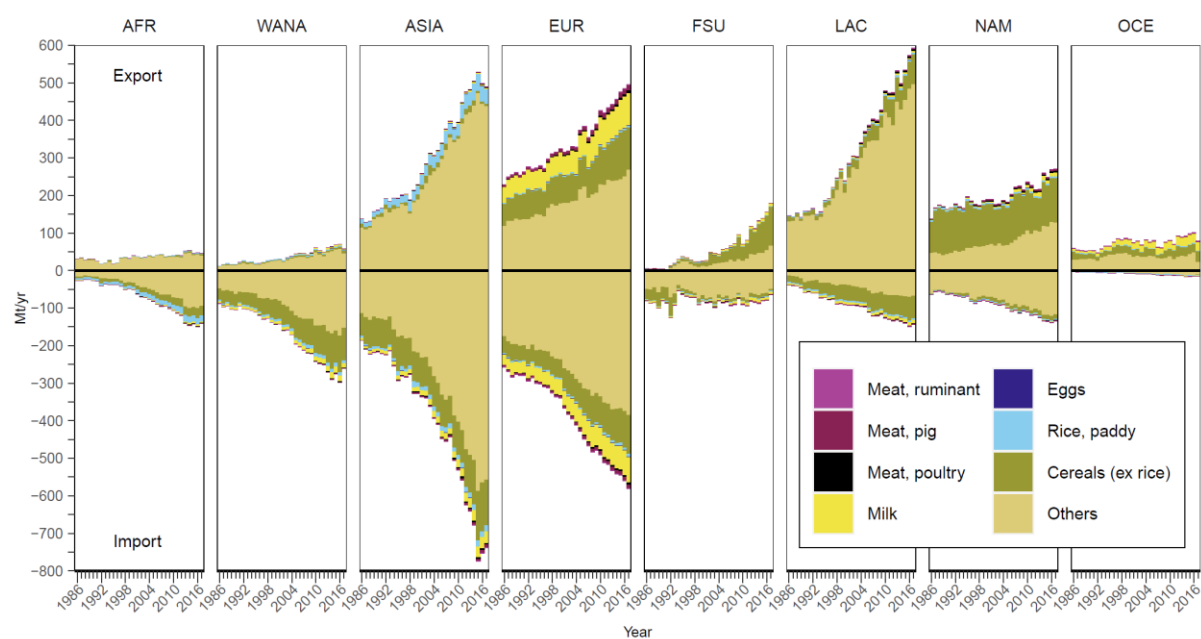
Supplementary Figure 3: Change in global-averaged emission intensities of eight food groups from 1986 to 2017. Note the different y-axis scale used for the food group 'Meat, ruminant', the emission intensity of which is more than ten times larger than those of all other food groups in all years. The jump in emission intensity of 'others' between 1989 and 1990 is due to the spike in total agricultural emissions for most countries in the FAOSTAT dataset 'Agriculture Total' during the same period. Values are shown for individual years, i.e., without averaging values for three years.



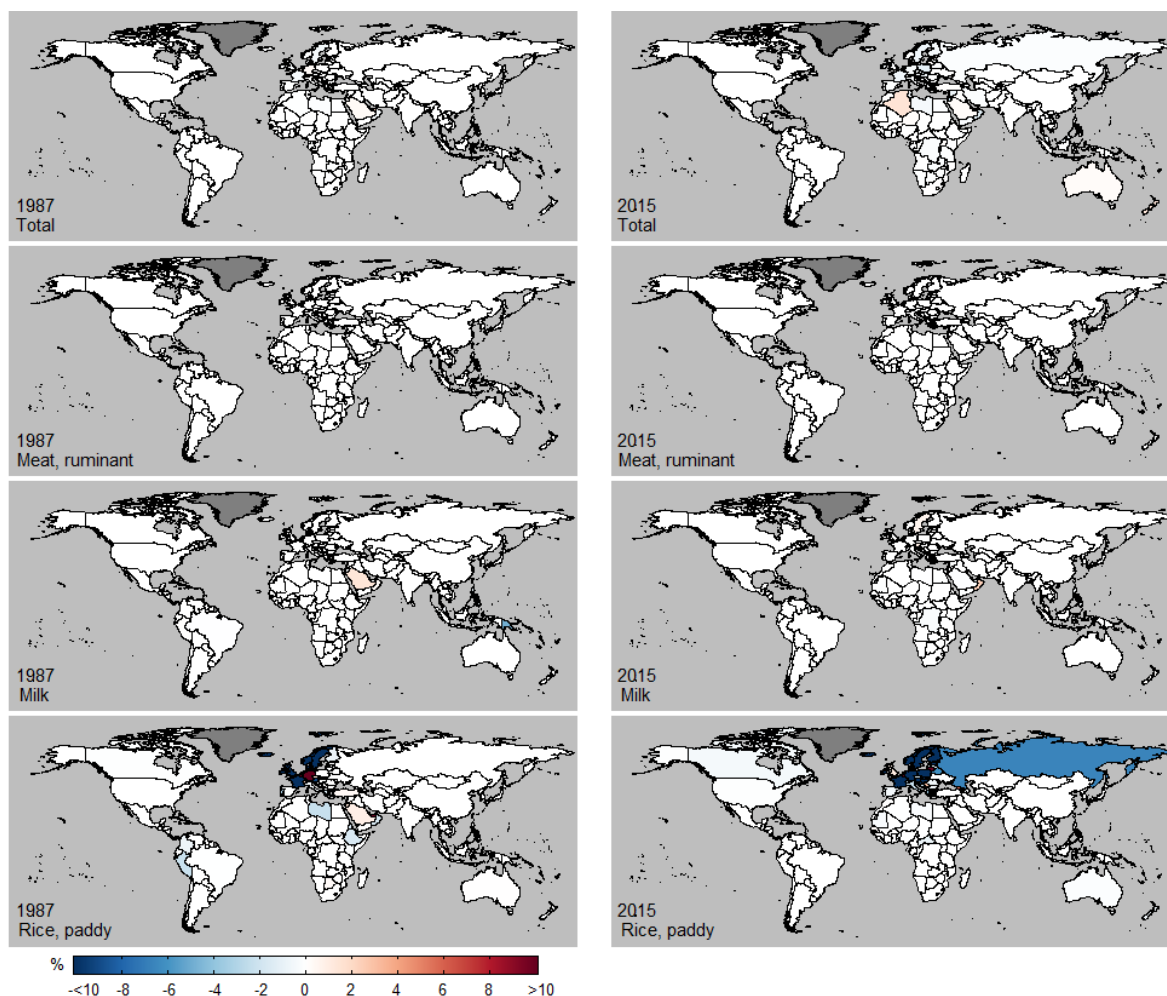
Supplementary Figure 4: Regional change in trade-adjusted agricultural emissions (TAEs) from 1986 to 2017. The regions analysed in this study are Africa (AFR), Western Asia and Northern Africa (WANA), Asia (ASIA), Europe (EUR), Former Soviet Union (FSU), Latin America and the Caribbean (LAC), North America (NAM), and Oceania (OCE). Additionally, the figure also provides a breakdown of the share of each food group. Values are shown for individual years, i.e., without averaging values for three years.



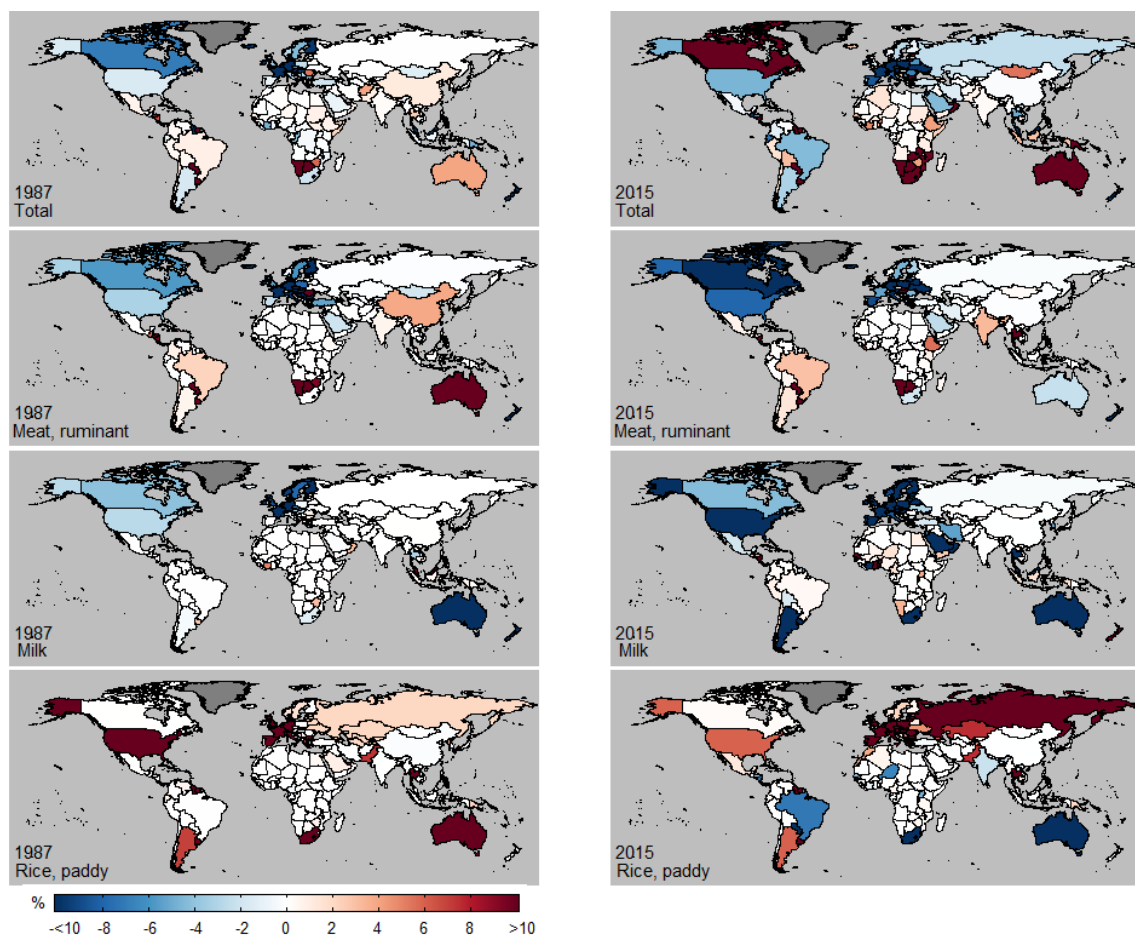
Supplementary Figure 5: Per capita differences between trade-adjusted agricultural emissions (TAEs) and production-based emissions (PBEs) in 1987 (a) and 2015 (b). Differences are calculated by subtracting PBE per capita from TAE per capita, such that the larger the positive difference (darker red), the higher is a country's per capita TAE compared to its per capita PBE (i.e., net importers of agricultural emissions). Likewise, the larger the negative difference (darker blue), the lower is a country's per capita TAE than its per capita PBE (i.e., net exporters of agricultural emissions). Dark grey colours indicate countries with no available data (e.g., Greenland).



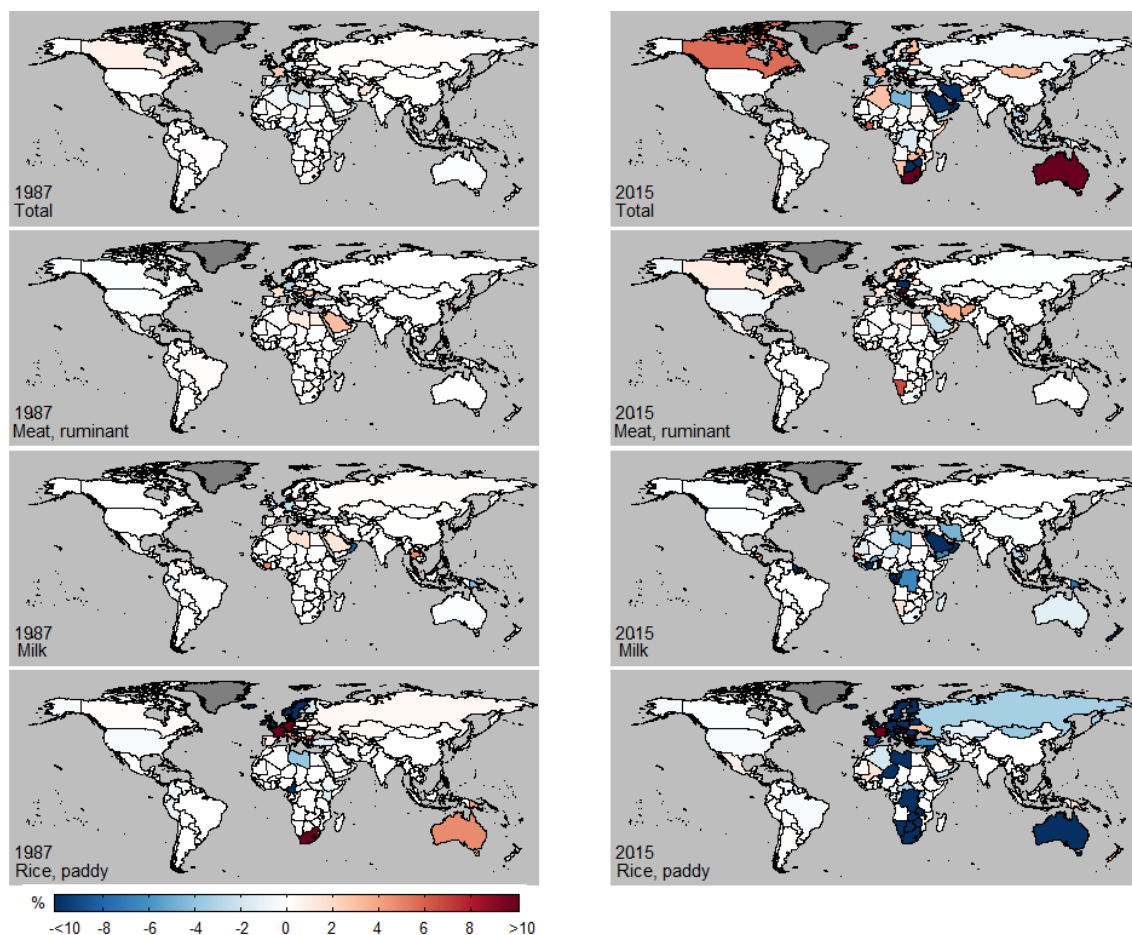
Supplementary Figure 6: Regional change in export and import volumes from 1986 to 2017. Exports are shown at the top half of the figure, while imports are shown at the bottom half. The regions analysed in this study are Africa (AFR), Western Asia and Northern Africa (WANA), Asia (ASIA), Europe (EUR), Former Soviet Union (FSU), Latin America and the Caribbean (LAC), North America (NAM), and Oceania (OCE). Additionally, the figure also provides a breakdown of the share of each food group. Values are shown for individual years, i.e., without averaging values for three years.



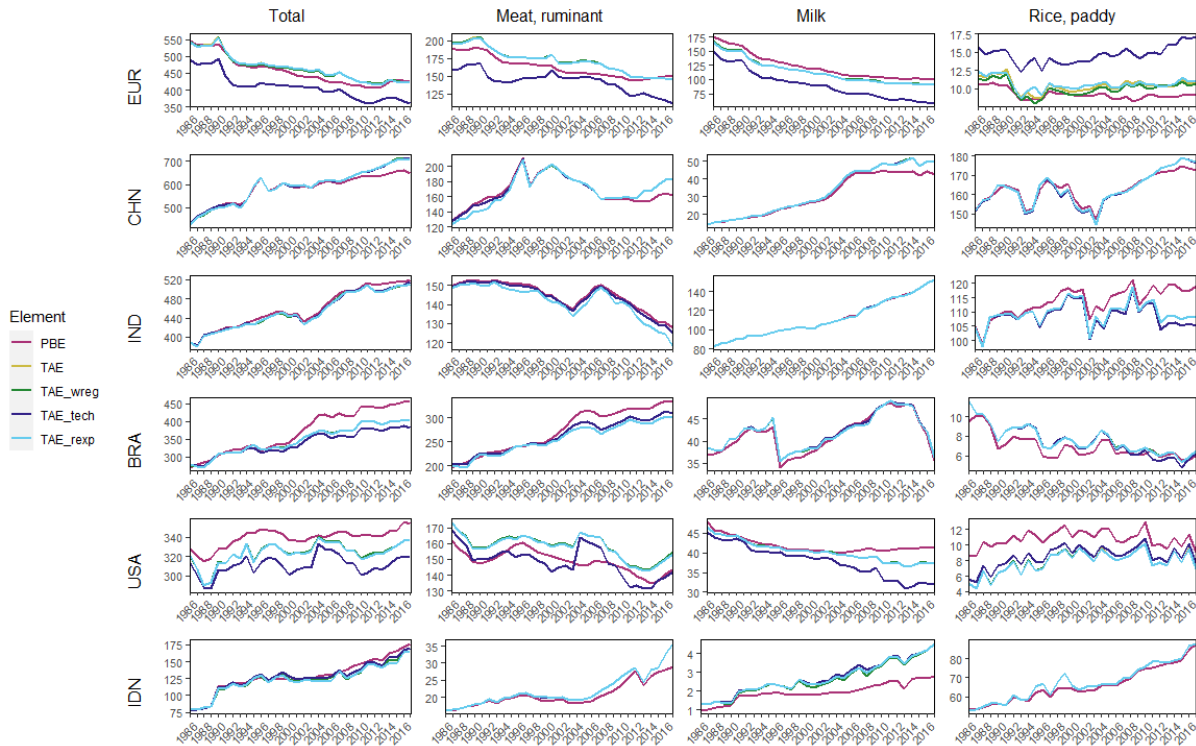
Supplementary Figure 7: Comparison of trade-adjusted agricultural emissions (TAEs) between original method and sensitivity analysis in which regional emission intensities were replaced by global emission intensities for non-producer countries, in 1987 and 2015. Comparison is made by calculating the percentage weighted differences between the TAEs of both approaches. Positive (darker red) values indicate lower TAEs using original method, whereas negative (darker blue) values indicate higher TAEs using original method. For example, the dark blue colours of Europe and Russia for paddy rice (bottom right panel) show that TAEs for paddy rice are higher using the original method, thus indicating the higher emission intensities in each respective region compared to the global average emission intensity for paddy rice. Dark grey colours indicate countries with no available data (e.g., Greenland).



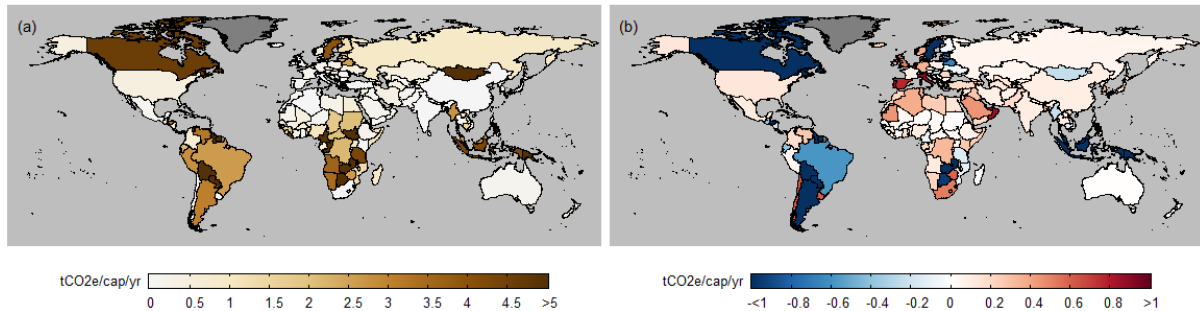
Supplementary Figure 8: Comparison of trade-adjusted agricultural emissions (TAEs) between original method and sensitivity analysis in which a 'technology-adjusted' approach based on Kander et al. (2015) was adopted, in 1987 and 2015. Comparison is made by calculating the percentage weighted differences between the TAEs of both approaches. Positive (darker red) values indicate lower TAEs using original method, whereas negative (darker blue) values indicate higher TAEs using original method. Dark grey colours indicate countries with no available data (e.g., Greenland).



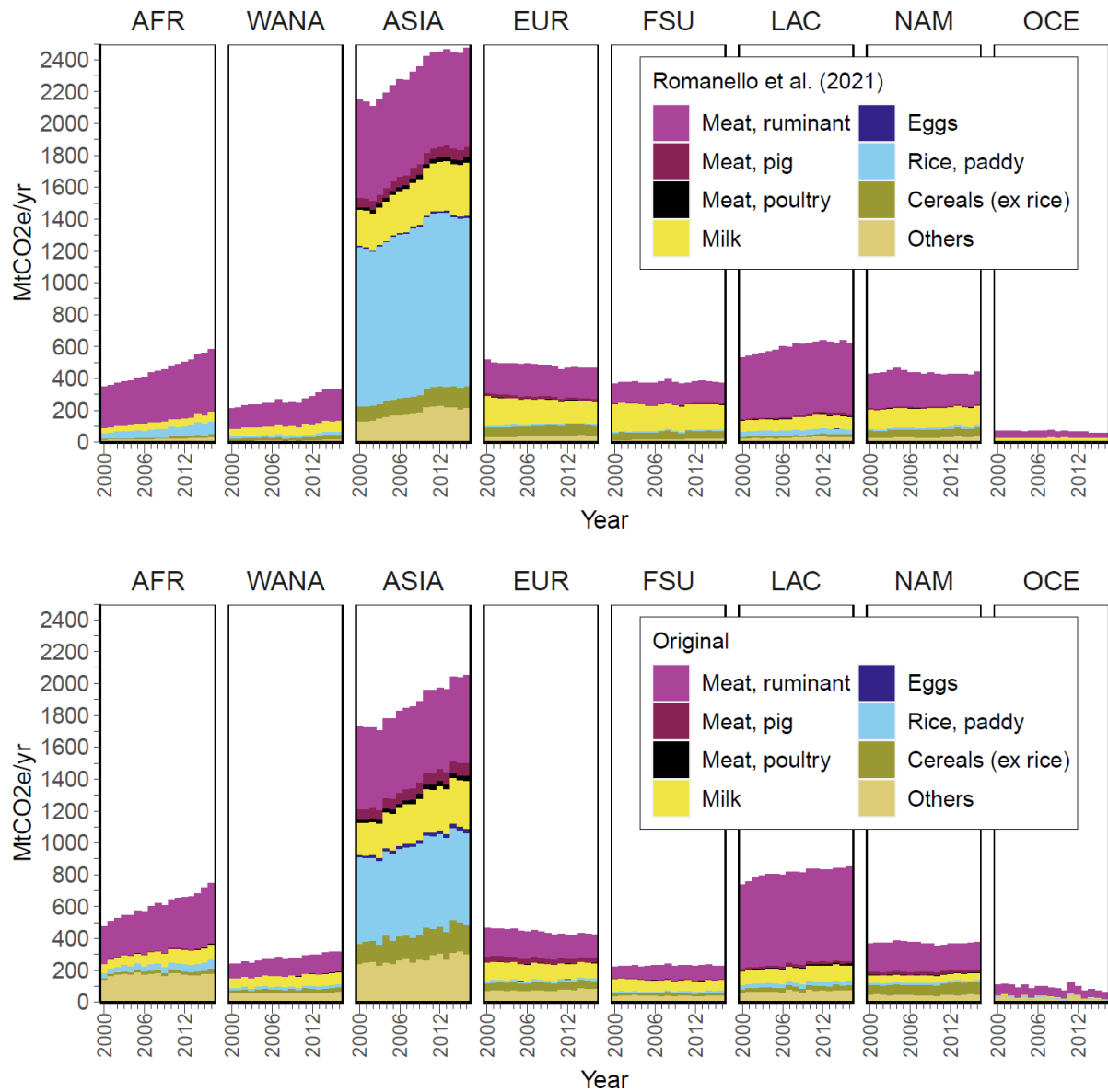
Supplementary Figure 9: Comparison of trade-adjusted agricultural emissions (TAEs) between original method and sensitivity analysis in which emission intensities for exports are adjusted to account for both production and imports, in 1987 and 2015. Comparison is made by calculating the percentage weighted differences between the TAEs of both approaches. Positive (darker red) values indicate lower TAEs using original method, whereas negative (darker blue) values indicate higher TAEs using original method. Dark grey colours indicate countries with no available data (e.g., Greenland).



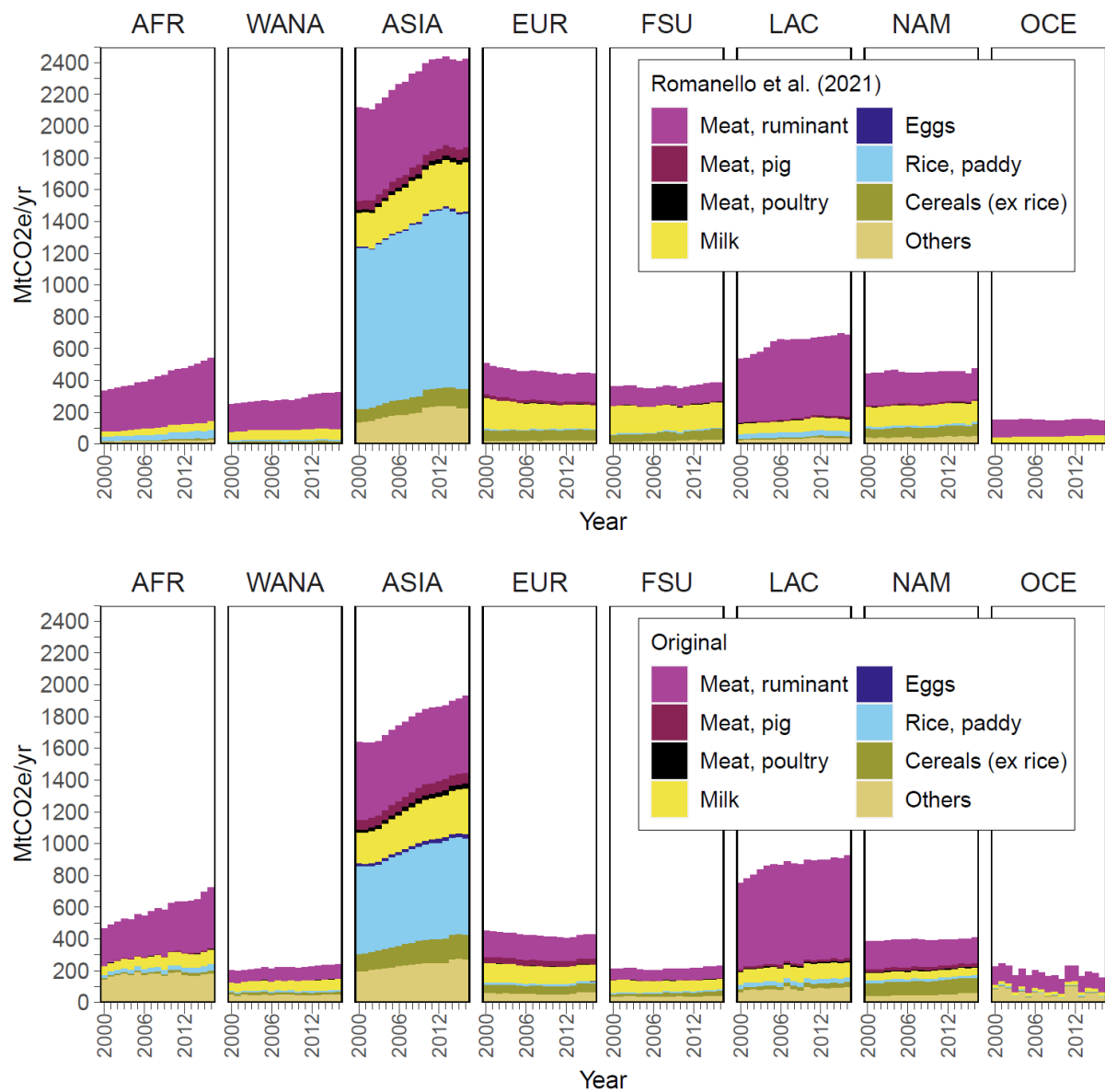
Supplementary Figure 10: Changes in production-based emissions (PBEs) and trade-adjusted agricultural emissions (TAEs) from 1986 to 2017. TAEs are shown for (1) the original approach, (2) the sensitivity analysis in which global emission intensities were used (TAE_wreg), (3) the sensitivity analysis which adopted a 'technology-adjusted' approach (TAE_tech), and (4) the sensitivity analysis which used emission intensities that account for both production and imports (TAE_rexp). The region/countries shown are Europe (EUR), China, mainland (CHN), India (IND), Brazil (BRA), United States of America (USA), and Indonesia (IDN). These are the five countries with the largest total absolute TAEs in 2015, while EUR is shown to provide a regional perspective. PBEs and TAEs are shown for all food groups collectively (Total), as well as for three food groups, i.e., (1) meat, ruminant, (2) milk, and (3) rice, paddy, which represent the food groups with the largest emission intensities. Values are shown for individual years, i.e., without averaging values for three years.



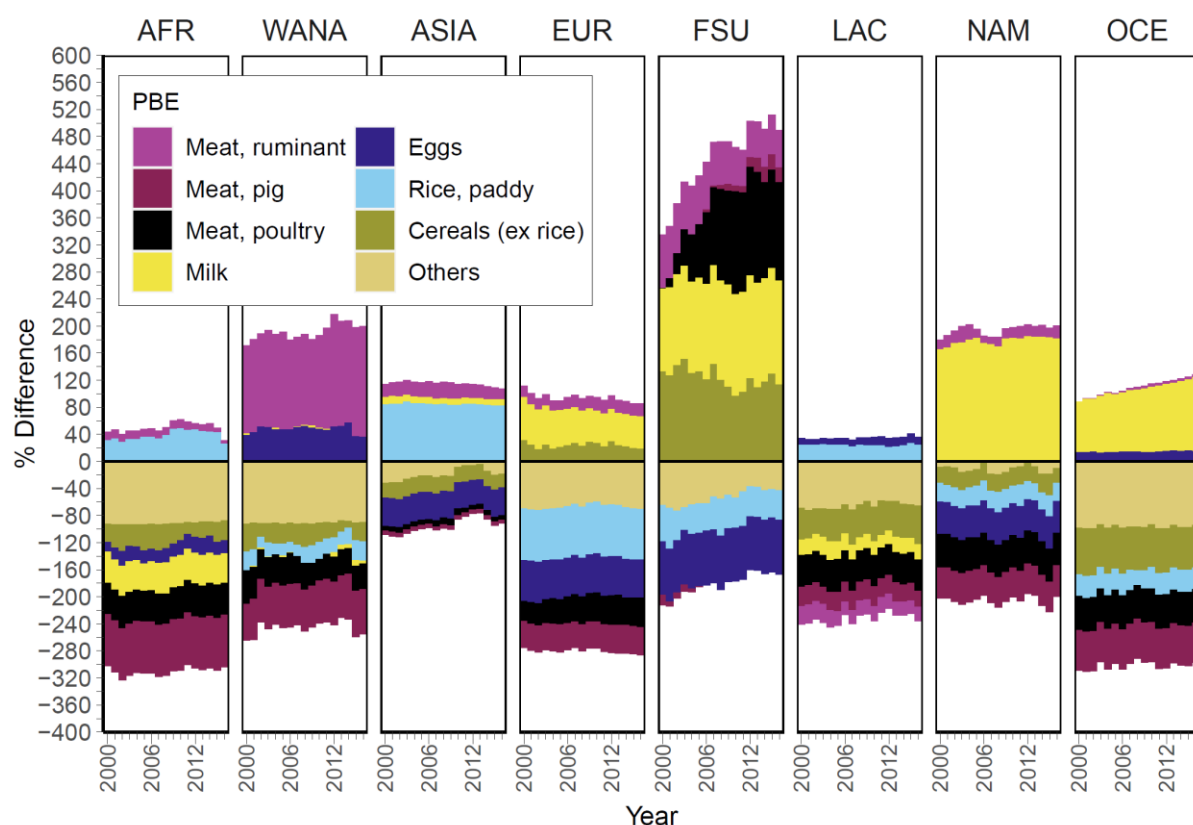
Supplementary Figure 11: Agricultural land use emissions per capita for 2015. Left panel (a) shows agricultural land use emissions per capita without trade adjustments. Right panel (b) shows the per capita differences between trade-adjusted agricultural land use emissions and agricultural land use emissions. Differences are calculated such that the larger the positive difference (darker red), the higher is a country's trade-adjusted agricultural land use emissions per capita (i.e., net importers of agricultural land use emissions). Likewise, the larger the negative difference (darker blue), the lower is a country's trade-adjusted agricultural land use emissions per capita (i.e., net exporters of agricultural land use emissions). Dark grey colours indicate countries with no available data (e.g., Greenland).



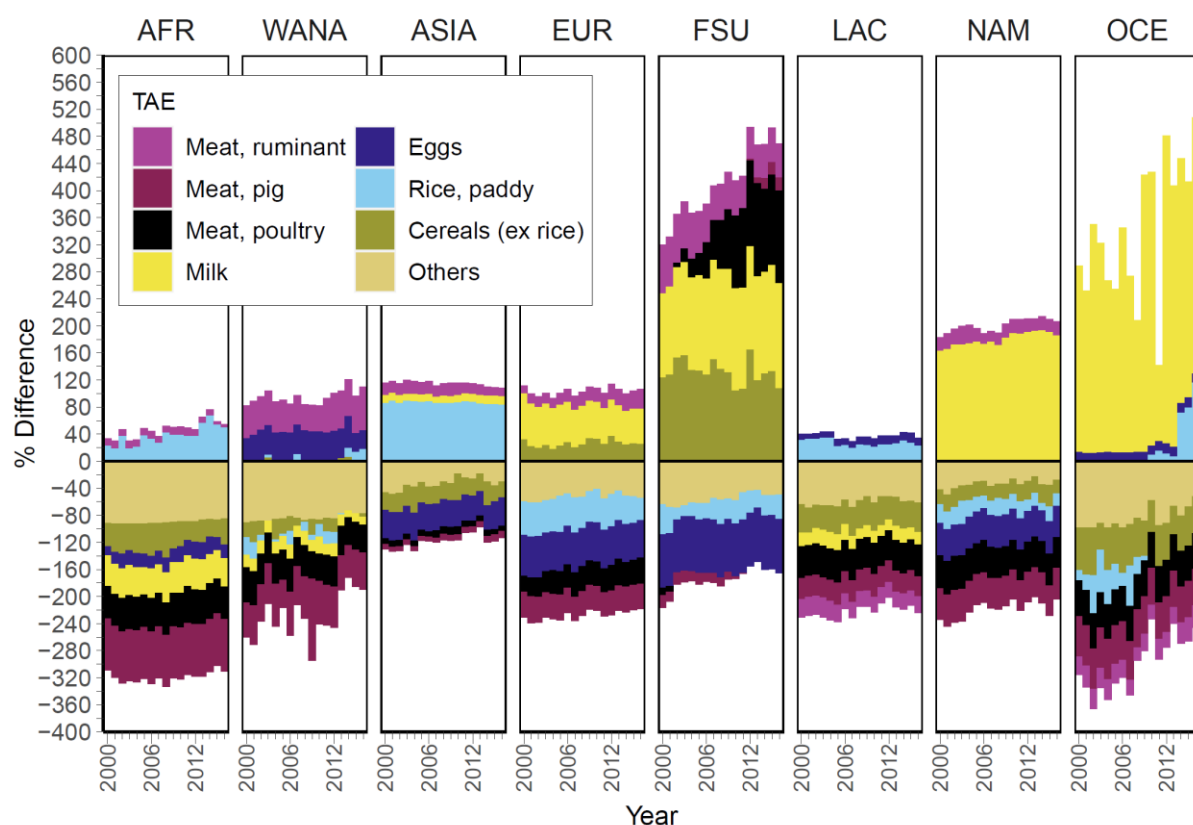
Supplementary Figure 12: Regional change in trade-adjusted agricultural emissions (TAEs) from 2000 to 2016, based on the approach used by Romanello et al. (2021) (above) and our approach (below). The regions analysed are Africa (AFR), Western Asia and Northern Africa (WANA), Asia (ASIA), Europe (EUR), Former Soviet Union (FSU), Latin America and the Caribbean (LAC), North America (NAM), and Oceania (OCE). Additionally, the figure also provides a breakdown of the share of each food group. Values are shown for individual years, i.e., without averaging values for three years.



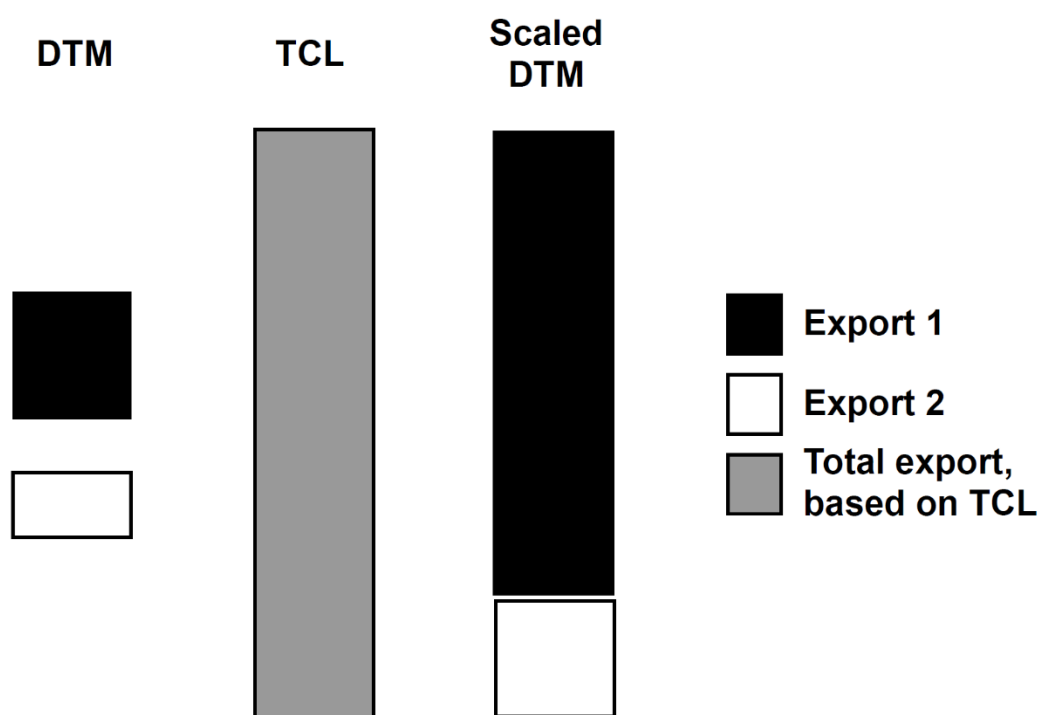
Supplementary Figure 13: Regional change in production-based emissions (PBEs) from 2000 to 2016, based on the approach used by Romanello et al. (2021) (above) and our approach (below). The regions analysed are Africa (AFR), Western Asia and Northern Africa (WANA), Asia (ASIA), Europe (EUR), Former Soviet Union (FSU), Latin America and the Caribbean (LAC), North America (NAM), and Oceania (OCE). Additionally, the figure also provides a breakdown of the share of each food group. Values are shown for individual years, i.e., without averaging values for three years.



Supplementary Figure 14: Percentage relative differences between production-based emissions (PBEs) from the approach used by Romanello et al. (2021) and our approach, from 2000 to 2016. Positive values indicate larger PBEs in Romanello et al. (2021) compared to our approach, whereas negative values indicate otherwise. The regions analysed are Africa (AFR), Western Asia and Northern Africa (WANA), Asia (ASIA), Europe (EUR), Former Soviet Union (FSU), Latin America and the Caribbean (LAC), North America (NAM), and Oceania (OCE). Additionally, the figure also provides a breakdown of the share of each food group. Values are shown for individual years, i.e., without averaging values for three years.



Supplementary Figure 15: Percentage relative differences between trade-adjusted agricultural emissions (TAEs) from the approach used by Romanello et al. (2021) and our approach, from 2000 to 2016. Positive values indicate larger TAEs in Romanello et al. (2021) compared to our approach, whereas negative values indicate otherwise. The regions analysed are Africa (AFR), Western Asia and Northern Africa (WANA), Asia (ASIA), Europe (EUR), Former Soviet Union (FSU), Latin America and the Caribbean (LAC), North America (NAM), and Oceania (OCE). Additionally, the figure also provides a breakdown of the share of each food group. Values are shown for individual years, i.e., without averaging values for three years.



Supplementary Figure 16: Illustration of the trade data scaling procedure used in this study. This procedure harmonises export and import figures from FAOSTAT's 'Detailed Trade Matrix' (DTM) and 'Trade – Crops and Livestock' (TCL) datasets, such that the sum of exports in the DTM matches those recorded in the TCL.

Supplementary Tables

Supplementary Table 1: List of countries and their respective UN ISO 3166-1 alpha-3 code and regional group. Groups are loosely based on the UN M49 Standard Geographical Classification¹. These regions are Africa (AFR), Asia (ASIA), Former Soviet Union (FSU), Europe (EUR), Latin America and the Caribbean (LAC), Western Asia and Northern Africa (WANA), North America (NAM), and Oceania (OCE).

Country	ISO 3166-1 alpha-3 code	Region
Afghanistan	AFG	ASIA
Albania	ALB	EUR
Algeria	DZA	WANA
American Samoa	ASM	OCE
Angola	AGO	AFR
Antigua and Barbuda	ATG	LAC
Argentina	ARG	LAC
Armenia	ARM	FSU
Australia	AUS	OCE
Austria	AUT	EUR
Azerbaijan	AZE	FSU
Bahamas	BHS	LAC
Bahrain	BHR	WANA
Bangladesh	BGD	ASIA
Barbados	BRB	LAC
Belarus	BLR	FSU
Belgium	BEL	EUR
Belgium-Luxembourg ²	-	EUR
Belize	BLZ	LAC
Benin	BEN	AFR
Bermuda	BMU	NAM
Bhutan	BTN	ASIA
Bolivia (Plurinational State of)	BOL	LAC
Bosnia and Herzegovina	BIH	EUR
Botswana	BWA	AFR
Brazil	BRA	LAC
British Virgin Islands	VGB	LAC
Brunei Darussalam	BRN	ASIA
Bulgaria	BGR	EUR
Burkina Faso	BFA	AFR
Burundi	BDI	AFR
Cabo Verde	CPV	AFR
Cambodia	KHM	ASIA
Cameroon	CMR	AFR
Canada	CAN	NAM
Cayman Islands	CYM	LAC
Central African Republic	CAF	AFR

¹ UN Statistics 2020: Methodology: Standard country or area codes for statistical use (M49), URL: <https://unstats.un.org/unsd/methodology/m49/>, accessed on 16.03.2020.

² Not a country *per se*, but rather an economic union between Belgium and Luxembourg, the name of which was used to represent both countries collectively for international trade statistics prior to 1999.

Country	ISO 3166-1 alpha-3 code	Region
Chad	TCD	AFR
Chile	CHL	LAC
China, Hong Kong SAR	HKG	ASIA
China, Macao SAR	MAC	ASIA
China, mainland	CHN	ASIA
China, Taiwan Province of	TWN	ASIA
Colombia	COL	LAC
Comoros	COM	AFR
Congo	COG	AFR
Cook Islands	COK	OCE
Costa Rica	CRI	LAC
Côte d'Ivoire	CIV	AFR
Croatia	HRV	EUR
Cuba	CUB	LAC
Cyprus	CYP	WANA
Czechia	CZE	EUR
Czechoslovakia	CSK	EUR
Democratic People's Republic of Korea	PRK	ASIA
Democratic Republic of the Congo	COD	AFR
Denmark	DNK	EUR
Djibouti	DJI	AFR
Dominica	DMA	LAC
Dominican Republic	DOM	LAC
Ecuador	ECU	LAC
Egypt	EGY	WANA
El Salvador	SLV	LAC
Equatorial Guinea	GNQ	AFR
Eritrea	ERI	AFR
Estonia	EST	FSU
Eswatini	SWZ	AFR
Ethiopia	ETH	AFR
Ethiopia PDR	ETH	AFR
Falkland Islands (Malvinas)	FLK	LAC
Faroe Islands	FRO	EUR
Fiji	FJI	OCE
Finland	FIN	EUR
France	FRA	EUR
French Polynesia	PYF	OCE
Gabon	GAB	AFR
Gambia	GMB	AFR
Georgia	GEO	FSU
Germany	DEU	EUR
Ghana	GHA	AFR
Greece	GRC	EUR
Grenada	GRD	LAC
Guam	GUM	OCE
Guatemala	GTM	LAC

Country	ISO 3166-1 alpha-3 code	Region
Guinea	GIN	AFR
Guinea-Bissau	GNB	AFR
Guyana	GUY	LAC
Haiti	HTI	LAC
Honduras	HND	LAC
Hungary	HUN	EUR
Iceland	ISL	EUR
India	IND	ASIA
Indonesia	IDN	ASIA
Iran (Islamic Republic of)	IRN	ASIA
Iraq	IRQ	WANA
Ireland	IRL	EUR
Israel	ISR	WANA
Italy	ITA	EUR
Jamaica	JAM	LAC
Japan	JPN	ASIA
Jordan	JOR	WANA
Kazakhstan	KAZ	FSU
Kenya	KEN	AFR
Kiribati	KIR	OCE
Kuwait	KWT	WANA
Kyrgyzstan	KGZ	FSU
Lao People's Democratic Republic	LAO	ASIA
Latvia	LVA	FSU
Lebanon	LBN	WANA
Lesotho	LSO	AFR
Liberia	LBR	AFR
Libya	LBY	WANA
Lithuania	LTU	FSU
Luxembourg	LUX	EUR
Madagascar	MDG	AFR
Malawi	MWI	AFR
Malaysia	MYS	ASIA
Maldives	MDV	ASIA
Mali	MLI	AFR
Malta	MLT	EUR
Mauritania	MRT	AFR
Mauritius	MUS	AFR
Mexico	MEX	LAC
Mongolia	MNG	ASIA
Montenegro	MNE	EUR
Morocco	MAR	WANA
Mozambique	MOZ	AFR
Myanmar	MMR	ASIA
Namibia	NAM	AFR
Nauru	NRU	OCE
Nepal	NPL	ASIA

Country	ISO 3166-1 alpha-3 code	Region
Netherlands	NLD	EUR
Netherlands Antilles (former)	ANT	LAC
New Caledonia	NCL	OCE
New Zealand	NZL	OCE
Nicaragua	NIC	LAC
Niger	NER	AFR
Nigeria	NGA	AFR
Niue	NIU	OCE
North Macedonia	MKD	EUR
Norway	NOR	EUR
Palestine	PSE	WANA
Oman	OMN	WANA
Pacific Islands Trust Territory	PCI	OCE
Pakistan	PAK	ASIA
Panama	PAN	LAC
Papua New Guinea	PNG	OCE
Paraguay	PRY	LAC
Peru	PER	LAC
Philippines	PHL	ASIA
Poland	POL	EUR
Portugal	PRT	EUR
Qatar	QAT	WANA
Republic of Korea	KOR	ASIA
Republic of Moldova	MDA	FSU
Romania	ROU	EUR
Russian Federation	RUS	FSU
Rwanda	RWA	AFR
Saint Kitts and Nevis	KNA	LAC
Saint Lucia	LCA	LAC
Saint Pierre and Miquelon	SPM	NAM
Saint Vincent and the Grenadines	VCT	LAC
Samoa	WSM	OCE
Sao Tome and Principe	STP	AFR
Saudi Arabia	SAU	WANA
Senegal	SEN	AFR
Serbia	SRB	EUR
Serbia and Montenegro	SCG	EUR
Seychelles	SYC	AFR
Sierra Leone	SLE	AFR
Singapore	SGP	ASIA
Slovakia	SVK	EUR
Slovenia	SVN	EUR
Solomon Islands	SLB	OCE
Somalia	SOM	AFR
South Africa	ZAF	AFR
South Sudan	SSD	WANA
Spain	ESP	EUR

Country	ISO 3166-1 alpha-3 code	Region
Sri Lanka	LKA	ASIA
Sudan	SDN	WANA
Sudan (former)	SDN	WANA
Suriname	SUR	LAC
Sweden	SWE	EUR
Switzerland	CHE	EUR
Syrian Arab Republic	SYR	WANA
Tajikistan	TJK	FSU
Thailand	THA	ASIA
Timor-Leste	TLS	ASIA
Togo	TGO	AFR
Tonga	TON	OCE
Trinidad and Tobago	TTO	LAC
Tunisia	TUN	WANA
Turkey	TUR	WANA
Turkmenistan	TKM	FSU
Tuvalu	TUV	OCE
Uganda	UGA	AFR
Ukraine	UKR	FSU
United Arab Emirates	ARE	WANA
United Kingdom	GBR	EUR
United Republic of Tanzania	TZA	AFR
United States of America	USA	NAM
Uruguay	URY	LAC
USSR	SUN	FSU
Uzbekistan	UZB	FSU
Vanuatu	VUT	OCE
Venezuela (Bolivarian Republic of)	VEN	LAC
Viet Nam	VNM	ASIA
Yemen	YEM	WANA
Yugoslav SFR	YUG	EUR
Zambia	ZMB	AFR
Zimbabwe	ZWE	AFR

Supplementary Table 2: List of food-related agricultural items. Names are shown as recorded in FAOSTAT, and the list includes each item's respective group, FAOSTAT emission intensity (EI) allocation, primary item, calorie values in kcal/100g, and source for calorie values. Sources are either from the FAO's nutritive factors list³, or from the United States Department of Agriculture (USDA)⁴. (*) indicates items that were not analysed in the study as they do not appear in the trade datasets, but whose calorie values were needed for conversion to primary item equivalents.

Commodity	Group	EI	Primary item	Calories (kcal/100g)	Source
Almonds shelled	Others	Others	Almonds, with shell	589	FAO
Almonds, with shell	Others	Others	Almonds, with shell	236	FAO
Anise, badian, fennel, coriander	Others	Others	Anise, badian, fennel, coriander	345	FAO
Apples	Others	Others	Apples	48	FAO
Apricots	Others	Others	Apricots	45	FAO
Apricots, dry	Others	Others	Apricots	238	FAO
Artichokes	Others	Others	Artichokes	20	FAO
Asparagus	Others	Others	Asparagus	12	FAO
Avocados	Others	Others	Avocados	119	FAO
Bacon and ham	Meat, pig	Meat, pig	Meat, pig	362	FAO
Bambara beans	Others	Others	Bambara beans	365	FAO
Bananas	Others	Others	Bananas	60	FAO
Barley	Cereals (ex rice)	Cereals excluding rice	Barley	332	FAO
Barley, pearled	Cereals (ex rice)	Cereals excluding rice	Barley	346	FAO
Beans, dry	Others	Others	Beans, dry	341	FAO
Beans, green	Others	Others	Beans, green	50	FAO
Beer of barley	Cereals (ex rice)	Cereals excluding rice	Barley	49	FAO
Beer of sorghum	Cereals (ex rice)	Cereals excluding rice	Sorghum	40	FAO
Beverages, fermented rice	Rice, paddy	Rice, paddy	Rice, paddy	133	FAO
Blueberries	Others	Others	Blueberries	120	FAO
Bran, maize	Cereals (ex rice)	Cereals excluding rice	Maize	224	USDA ⁵
Bran, wheat	Cereals (ex rice)	Cereals excluding rice	Wheat	213	FAO
Brazil nuts, shelled	Others	Others	Brazil nuts, with shell	656	FAO

³ FAO 2019: Nutritive Factors, URL: <http://www.fao.org/economic/the-statistics-division-ess/publications-studies/publications/nutritive-factors/en/>, accessed on 05.06.2019.

⁴ USDA 2018: USDA Food Composition Databases, URL: <https://ndb.nal.usda.gov/ndb/search/list?home=true>, accessed on 05.06.2019.

⁵ USDA name: Corn bran, crude; USDA Data Type: SR Legacy.

Commodity	Group	EI	Primary item	Calories (kcal/100g)	Source
Brazil nuts, with shell *	Others	Others	Brazil nuts, with shell	315	FAO
Bread	Cereals (ex rice)	Cereals excluding rice	Wheat	249	FAO
Broad beans, horse beans, dry	Others	Others	Broad beans, horse beans, dry	341	USDA ⁶
Buckwheat	Cereals (ex rice)	Others	Buckwheat	330	FAO
Bulgur	Cereals (ex rice)	Cereals excluding rice	Wheat	345	FAO
Butter of karite nuts	Others	Others	Karite nuts (sheanuts)	711	FAO
Butter, cow milk	Milk	Milk, whole fresh cow	Milk, whole fresh cow	717	FAO
Buttermilk, curdled, acidified milk	Milk	Milk, whole fresh cow	Milk, whole fresh cow	75	FAO
Cabbages and other brassicas	Others	Others	Cabbages and other brassicas	19	FAO
Cake, groundnuts	Others	Others	Groundnuts, with shell	363	FAO
Cake, sesame seed	Others	Others	Sesame seed	376	FAO
Cake, soybeans	Others	Others	Soybeans	261	FAO
Canary seed	Cereals (ex rice)	Others	Canary seed	388	FAO
Carrots and turnips	Others	Others	Carrots and turnips	38	FAO
Cashew nuts, shelled	Others	Others	Cashew nuts, with shell	574	FAO
Cashew nuts, with shell	Others	Others	Cashew nuts, with shell	252	FAO
Cashewapple	Others	Others	Cashewapple	43	FAO
Cassava	Others	Others	Cassava	109	FAO
Cassava dried	Others	Others	Cassava	212	FAO
Cauliflowers and broccoli	Others	Others	Cauliflowers and broccoli	9	FAO
Cereals, breakfast	Cereals (ex rice)	Others	Cereals, nes	389	FAO
Cereals, nes *	Cereals (ex rice)	Others	Cereals, nes	340	FAO
Cheese, processed	Milk	Milk, whole fresh cow	Milk, whole fresh cow	103	FAO
Cheese, sheep milk	Milk	Milk, whole fresh sheep	Milk, whole fresh sheep	310	FAO
Cheese, whole cow milk	Milk	Milk, whole fresh cow	Milk, whole fresh cow	387	FAO
Cherries	Others	Others	Cherries	65	FAO

⁶ USDA name: Broadbeans (fava beans), mature seeds, raw; USDA Data Type: SR Legacy.

Commodity	Group	EI	Primary item	Calories (kcal/100g)	Source
Cherries, sour	Others	Others	Cherries, sour	45	FAO
Chestnut	Others	Others	Chestnut	158	FAO
Chick peas	Others	Others	Chick peas	358	FAO
Chillies and peppers, dry	Others	Others	Chillies and peppers, dry	318	FAO
Chillies and peppers, green	Others	Others	Chillies and peppers, green	25	FAO
Chocolate products nes	Others	Others	Cocoa, beans	393	FAO
Cinnamon (cannella)	Others	Others	Cinnamon (cannella)	261	FAO
Cloves	Others	Others	Cloves	323	FAO
Cocoa, beans	Others	Others	Cocoa, beans	414	FAO
Cocoa, butter	Others	Others	Cocoa, beans	711	FAO
Cocoa, paste	Others	Others	Cocoa, beans	472	FAO
Cocoa, powder & cake	Others	Others	Cocoa, beans	261	FAO
Coconuts	Others	Others	Coconuts	184	FAO
Coconuts, desiccated	Others	Others	Coconuts	660	FAO
Coffee, extracts	Others	Others	Coffee, green	129	FAO
Coffee, green	Others	Others	Coffee, green	47	FAO
Coffee, roasted	Others	Others	Coffee, green	56	FAO
Coffee, substitutes containing coffee	Others	Others	Coffee, green	56	FAO
Copra	Others	Others	Coconuts	636	FAO
Cottonseed	Others	Others	Cottonseed	253	FAO
Cranberries	Others	Others	Cranberries	47	FAO
Cream fresh	Milk	Milk, whole fresh cow	Milk, whole fresh cow	195	FAO
Cucumbers and gherkins	Others	Others	Cucumbers and gherkins	13	FAO
Currants	Others	Others	Currants	59	FAO
Dates	Others	Others	Dates	156	FAO
Eggplants (aubergines)	Others	Others	Eggplants (aubergines)	21	FAO
Eggs, dried	Eggs	Eggs, hen, in shell	Eggs, hen, in shell	594	FAO
Eggs, hen, in shell	Eggs	Eggs, hen, in shell	Eggs, hen, in shell	139	FAO
Eggs, liquid	Eggs	Eggs, hen, in shell	Eggs, hen, in shell	158	FAO
Eggs, other bird, in shell	Eggs	Eggs, hen, in shell	Eggs, other bird, in shell	163	FAO
Fat, camels	Others	Others	Meat, camel	847	FAO
Fat, cattle	Meat, ruminant	Meat, cattle	Fat, cattle	847	FAO

Commodity	Group	EI	Primary item	Calories (kcal/100g)	Source
Fat, liver prepared (foie gras)	Meat, poultry	Meat, chicken	Meat, goose and guinea fowl	462	FAO
Fat nes, prepared	Others	Others	Meat nes	720	FAO
Fat, pigs	Meat, pig	Meat, pig	Fat, pigs	712	FAO
Figs	Others	Others	Figs	73	FAO
Figs dried	Others	Others	Figs	253	FAO
Flour, cassava	Others	Others	Cassava	338	FAO
Flour, cereals	Cereals (ex rice)	Others	Cereals, nes	364	FAO
Flour, fonio	Cereals (ex rice)	Cereals excluding rice	Fonio	355	FAO
Flour, maize	Cereals (ex rice)	Cereals excluding rice	Maize	363	FAO
Flour, mixed grain	Cereals (ex rice)	Others	Grain, mixed	364	FAO
Flour, mustard	Others	Others	Mustard seed	469	FAO
Flour, potatoes	Others	Others	Potatoes	355	FAO
Flour, pulses	Others	Others	Pulses, nes	340	FAO
Flour, rice	Rice, paddy	Rice, paddy	Rice, paddy	366	FAO
Flour, roots and tubers nes	Others	Others	Roots and tubers nes	282	FAO
Flour, wheat	Cereals (ex rice)	Cereals excluding rice	Wheat	364	FAO
Fonio	Cereals (ex rice)	Others	Fonio	338	FAO
Fructose and syrup, other	Others	Others	Sugar crops nes	368	USDA ⁷
Fruit, citrus nes *	Others	Others	Fruit, citrus nes	26	FAO
Fruit, cooked, homogenized preparations	Others	Others	Fruit, fresh nes	59	FAO
Fruit, dried nes	Others	Others	Fruit, fresh nes	267	FAO
Fruit, fresh nes	Others	Others	Fruit, fresh nes	45	FAO
Fruit, prepared nes	Others	Others	Fruit, fresh nes	36	FAO
Fruit, tropical fresh nes	Others	Others	Fruit, tropical fresh nes	41	FAO
Garlic	Others	Others	Garlic	130	FAO
Germ, maize	Cereals (ex rice)	Cereals excluding rice	Maize	373	FAO

⁷ USDA name: Sweeteners, tabletop, fructose, dry, powder; USDA Data Type: SR Legacy.

Commodity	Group	EI	Primary item	Calories (kcal/100g)	Source
Ghee, buffalo milk	Milk	Milk, whole fresh buffalo	Milk, whole fresh buffalo	873	FAO
Ginger	Others	Others	Ginger	347	FAO
Glucose and dextrose	Others	Others	Sugar crops nes	368	FAO
Gooseberries	Others	Others	Gooseberries	44	FAO
Grain, mixed	Cereals (ex rice)	Others	Grain, mixed	340	FAO
Grapefruit (inc. pomelos)	Others	Others	Grapefruit (inc. pomelos)	16	FAO
Grapes	Others	Others	Grapes	53	FAO
Groundnuts, prepared	Others	Others	Groundnuts, with shell	580	FAO
Groundnuts, shelled	Others	Others	Groundnuts, with shell	567	FAO
Groundnuts, with shell *	Others	Others	Groundnuts, with shell	414	FAO
Hazelnuts, shelled	Others	Others	Hazelnuts, with shell	632	FAO
Hazelnuts, with shell	Others	Others	Hazelnuts, with shell	291	FAO
Honey, natural	Others	Others	Honey, natural	298	FAO
Hops	Others	Others	Hops	NA	NA
Ice cream and edible ice	Milk	Milk, whole fresh cow	Milk, whole fresh cow	149	FAO
Infant food	Cereals (ex rice)	Others	Cereals, nes	368	FAO
Juice, apple, concentrated	Others	Others	Apples	166	FAO
Juice, apple, single strength	Others	Others	Apples	47	FAO
Juice, citrus, concentrated	Others	Others	Fruit, citrus nes	157	FAO
Juice, citrus, single strength	Others	Others	Fruit, citrus nes	47	FAO
Juice, fruit nes	Others	Others	Fruit, fresh nes	48	FAO
Juice, grape	Others	Others	Grapes	61	FAO
Juice, grapefruit	Others	Others	Grapefruit (inc. pomelos)	39	FAO
Juice, grapefruit, concentrated	Others	Others	Grapefruit (inc. pomelos)	146	FAO
Juice, lemon, concentrated	Others	Others	Lemons and limes	116	FAO
Juice, lemon, single strength	Others	Others	Lemons and limes	22	FAO
Juice, orange, concentrated	Others	Others	Oranges	159	FAO
Juice, orange, single strength	Others	Others	Oranges	42	FAO
Juice, pineapple	Others	Others	Pineapples	56	FAO

Commodity	Group	EI	Primary item	Calories (kcal/100g)	Source
Juice, pineapple, concentrated	Others	Others	Pineapples	179	FAO
Juice, plum, concentrated	Others	Others	Plums and sloes	215	FAO
Juice, plum, single strength	Others	Others	Plums and sloes	71	FAO
Juice, tomato	Others	Others	Tomatoes	17	USDA ⁸
Karite nuts (sheanuts)	Others	Others	Karite nuts (sheanuts)	579	FAO
Kiwi fruit	Others	Others	Kiwi fruit	52	FAO
Kola nuts	Others	Others	Kola nuts	355	FAO
Lactose	Milk	Milk, whole fresh cow	Milk, whole fresh cow	387	FAO
Lard	Meat, pig	Meat, pig	Fat, pigs	902	FAO
Leeks, other alliaceous vegetables	Others	Others	Leeks, other alliaceous vegetables	37	FAO
Lemons and limes	Others	Others	Lemons and limes	15	FAO
Lentils	Others	Others	Lentils	346	FAO
Lettuce and chicory	Others	Others	Lettuce and chicory	12	FAO
Linseed	Others	Others	Linseed	498	FAO
Macaroni	Cereals (ex rice)	Cereals excluding rice	Wheat	367	FAO
Maize	Cereals (ex rice)	Cereals excluding rice	Maize	356	FAO
Maize, green	Others	Others	Maize, green	56	FAO
Malt	Cereals (ex rice)	Cereals excluding rice	Barley	368	FAO
Mangoes, mangosteens, guavas	Others	Others	Mangoes, mangosteens, guavas	45	FAO
Maple sugar and syrups	Others	Others	Sugar crops nes	348	FAO
MatÃ©	Others	Others	MatÃ©	40	FAO
Meat, beef and veal sausages	Meat, ruminant	Meat, cattle	Meat, cattle	313	FAO
Meat, beef, preparations	Meat, ruminant	Meat, cattle	Meat, cattle	233	FAO
Meat, ass	Others	Others	Meat, ass	94	FAO
Meat, camel *	Others	Others	Meat, camel	174	FAO
Meat, cattle	Meat, ruminant	Meat, cattle	Meat, cattle	225	FAO

⁸ USDA name: Tomato juice, canned, without salt added; USDA Data Type: SR Legacy.

Commodity	Group	El	Primary item	Calories (kcal/100g)	Source
Meat, cattle, boneless (beef & veal)	Meat, ruminant	Meat, cattle	Meat, cattle	150	FAO
Meat, chicken	Meat, poultry	Meat, chicken	Meat, chicken	122	FAO
Meat, chicken, canned	Meat, poultry	Meat, chicken	Meat, chicken	165	FAO
Meat, dried nes	Others	Others	Meat nes	250	FAO
Meat, duck	Meat, poultry	Meat, chicken	Meat, duck	291	FAO
Meat, game	Others	Others	Meat, game	104	FAO
Meat, goat	Meat, ruminant	Meat, goat	Meat, goat	123	FAO
Meat, goose and guinea fowl	Meat, poultry	Meat, chicken	Meat, goose and guinea fowl	301	FAO
Meat, horse	Others	Others	Meat, horse	85	FAO
Meat nes	Others	Others	Meat nes	126	FAO
Meat, pig	Meat, pig	Meat, pig	Meat, pig	326	FAO
Meat, pig sausages	Meat, pig	Meat, pig	Meat, pig	417	FAO
Meat, pig, preparations	Meat, pig	Meat, pig	Meat, pig	239	FAO
Meat, pork	Meat, pig	Meat, pig	Meat, pig	220	FAO
Meat, rabbit	Others	Others	Meat, rabbit	118	FAO
Meat, sheep	Meat, ruminant	Meat, sheep	Meat, sheep	263	FAO
Meat, turkey	Meat, poultry	Meat, chicken	Meat, turkey	126	FAO
Melons, other (inc.cantaloupes)	Others	Others	Melons, other (inc.cantaloupes)	17	FAO
Milk, reconstituted	Milk	Milk, whole fresh cow	Milk, whole fresh cow	61	FAO
Milk, skimmed cow	Milk	Milk, whole fresh cow	Milk, whole fresh cow	35	FAO
Milk, skimmed dried	Milk	Milk, whole fresh cow	Milk, whole fresh cow	362	FAO
Milk, whole condensed	Milk	Milk, whole fresh cow	Milk, whole fresh cow	321	FAO
Milk, whole dried	Milk	Milk, whole fresh cow	Milk, whole fresh cow	496	FAO
Milk, whole evaporated	Milk	Milk, whole fresh cow	Milk, whole fresh cow	134	FAO
Milk, whole fresh buffalo *	Milk	Milk, whole fresh buffalo	Milk, whole fresh buffalo	97	FAO
Milk, whole fresh cow	Milk	Milk, whole fresh cow	Milk, whole fresh cow	61	FAO
Milk, whole fresh sheep	Milk	Milk, whole fresh sheep	Milk, whole fresh sheep	94	FAO

Commodity	Group	EI	Primary item	Calories (kcal/100g)	Source
Millet	Cereals (ex rice)	Cereals excluding rice	Millet	340	FAO
Molasses	Others	Others	Sugar beet and cane	232	FAO
Mushrooms and truffles	Others	Others	Mushrooms and truffles	24	FAO
Mushrooms, canned	Others	Others	Mushrooms and truffles	24	FAO
Mustard seed	Others	Others	Mustard seed	469	FAO
Nutmeg, mace and cardamoms	Others	Others	Nutmeg, mace and cardamoms	525	FAO
Nuts nes	Others	Others	Nuts nes	262	FAO
Nuts, prepared (exc. groundnuts)	Others	Others	Nuts nes	615	FAO
Oats	Cereals (ex rice)	Cereals excluding rice	Oats	385	FAO
Oats rolled	Cereals (ex rice)	Cereals excluding rice	Oats	384	FAO
Offals, edible, cattle	Meat, ruminant	Meat, cattle	Offals, edible, cattle	105	FAO
Offals, edible, goats	Meat, ruminant	Meat, goat	Offals, edible, goats	117	FAO
Offals, liver chicken	Meat, poultry	Meat, chicken	Offals, liver chicken	125	FAO
Offals, liver duck	Meat, poultry	Meat, chicken	Offals, liver duck	136	FAO
Offals, liver geese	Meat, poultry	Meat, chicken	Offals, liver geese	133	FAO
Offals, pigs, edible	Meat, pig	Meat, pig	Offals, pigs, edible	113	FAO
Offals, sheep,edible	Meat, ruminant	Meat, sheep	Offals, sheep,edible	117	FAO
Oil palm fruit *	Others	Others	Oil palm fruit	158	FAO
Oil, coconut (copra)	Others	Others	Coconuts	884	FAO
Oil, cottonseed	Others	Others	Cottonseed	884	FAO
Oils, fats of animal nes	Others	Others	Meat nes	902	FAO
Oil, groundnut	Others	Others	Groundnuts, with shell	884	FAO
Oil, linseed	Others	Others	Linseed	884	FAO
Oil, maize	Cereals (ex rice)	Cereals excluding rice	Maize	884	FAO
Oil, olive, virgin	Others	Others	Olives	884	FAO
Oil, palm	Others	Others	Oil palm fruit	884	FAO
Oil, palm kernel	Others	Others	Oil palm fruit	884	FAO

Commodity	Group	EI	Primary item	Calories (kcal/100g)	Source
Oil, poppy	Others	Others	Poppy seed	884	FAO
Oil, rapeseed	Others	Others	Rapeseed	884	FAO
Oil, rice bran	Rice, paddy	Rice, paddy	Rice, paddy	884	FAO
Oil, safflower	Others	Others	Safflower seed	884	FAO
Oil, sesame	Others	Others	Sesame seed	884	FAO
Oil, soybean	Others	Others	Soybeans	884	FAO
Oil, sunflower	Others	Others	Sunflower seed	884	FAO
Oil, vegetable origin nes	Others	Others	Oilseeds nes	884	FAO
Oilseeds nes	Others	Others	Oilseeds nes	387	FAO
Olives	Others	Others	Olives	175	FAO
Olives preserved	Others	Others	Olives	109	FAO
Onions, dry	Others	Others	Onions, dry	31	FAO
Onions, shallots, green	Others	Others	Onions, shallots, green	24	FAO
Oranges	Others	Others	Oranges	34	FAO
Papayas	Others	Others	Papayas	26	FAO
Pastry	Cereals (ex rice)	Cereals excluding rice	Wheat	369	FAO
Peaches and nectarines	Others	Others	Peaches and nectarines	33	FAO
Peanut butter	Others	Others	Groundnuts, with shell	589	FAO
Pears	Others	Others	Pears	54	FAO
Peas, dry	Others	Others	Peas, dry	346	FAO
Peas, green	Others	Others	Peas, green	31	FAO
Pepper (piper spp.)	Others	Others	Pepper (piper spp.)	276	FAO
Peppermint	Others	Others	Peppermint	70	USDA ⁹
Persimmons	Others	Others	Persimmons	82	FAO
Pineapples	Others	Others	Pineapples	26	FAO
Pineapples canned	Others	Others	Pineapples	78	FAO
Pistachios	Others	Others	Pistachios	289	FAO
Plantains and others	Others	Others	Plantains and others	75	FAO
Plums and sloes	Others	Others	Plums and sloes	52	FAO
Plums dried (prunes)	Others	Others	Plums and sloes	208	FAO
Popcorn	Cereals (ex rice)	Cereals excluding rice	Maize	356	FAO
Poppy seed	Others	Others	Poppy seed	533	FAO
Potatoes	Others	Others	Potatoes	67	FAO
Potatoes, frozen	Others	Others	Potatoes	73	FAO
Pulses, nes *	Others	Others	Pulses, nes	340	FAO

⁹ USDA name: Peppermint, fresh; USDA Data Type: SR Legacy.

Commodity	Group	EI	Primary item	Calories (kcal/100g)	Source
Pumpkins, squash and gourds	Others	Others	Pumpkins, squash and gourds	19	FAO
Quinces	Others	Others	Quinces	35	FAO
Quinoa	Others	Others	Quinoa	342	FAO
Raisins	Others	Others	Grapes	299	FAO
Rapeseed	Others	Others	Rapeseed	494	FAO
Rice - total (Rice milled equivalent)	Rice, paddy	Rice, paddy	Rice, paddy	359	FAO
Rice, broken	Rice, paddy	Rice, paddy	Rice, paddy	360	FAO
Rice, husked	Rice, paddy	Rice, paddy	Rice, paddy	357	FAO
Rice, milled	Rice, paddy	Rice, paddy	Rice, paddy	360	FAO
Rice, paddy *	Rice, paddy	Rice, paddy	Rice, paddy	280	FAO
Roots and tubers nes	Others	Others	Roots and tubers nes	91	FAO
Rye	Cereals (ex rice)	Cereals excluding rice	Rye	319	FAO
Safflower seed *	Others	Others	Safflower seed	314	FAO
Sesame seed	Others	Others	Sesame seed	573	FAO
Sorghum	Cereals (ex rice)	Cereals excluding rice	Sorghum	343	FAO
Soya curd	Others	Others	Soybeans	58	FAO
Soya paste	Others	Others	Soybeans	114	FAO
Soya sauce	Others	Others	Soybeans	56	FAO
Soybeans	Others	Others	Soybeans	335	FAO
Spices nes	Others	Others	Spices nes	337	FAO
Spinach	Others	Others	Spinach	16	FAO
Starch, cassava	Others	Others	Cassava	362	FAO
Strawberries	Others	Others	Strawberries	28	FAO
Sugar beet	Others	Others	Sugar beet	70	FAO
Sugar beet and cane *	Others	Others	Sugar beet and cane	50	Calculate d
Sugar confectionery	Others	Others	Sugar crops nes	310	FAO
Sugar crops nes	Others	Others	Sugar crops nes	390	FAO
Sugar flavoured	Others	Others	Sugar crops nes	310	FAO
Sugar non- centrifugal	Others	Others	Sugar beet and cane	351	FAO
Sugar Raw Centrifugal	Others	Others	Sugar beet and cane	373	FAO
Sugar refined	Others	Others	Sugar beet and cane	387	FAO
Sugar nes	Others	Others	Sugar crops nes	310	FAO

Commodity	Group	EI	Primary item	Calories (kcal/100g)	Source
Sunflower seed	Others	Others	Sunflower seed	308	FAO
Sweet corn frozen	Others	Others	Maize, green	54	FAO
Sweet corn prep or preserved	Others	Others	Maize, green	77	FAO
Sweet potatoes	Others	Others	Sweet potatoes	92	FAO
Tangerines, mandarins, clementines, satsumas	Others	Others	Tangerines, mandarins, clementines, satsumas	32	FAO
Tea	Others	Others	Tea	40	FAO
Tea, mate extracts	Others	Others	Tea	18	FAO
Tomatoes	Others	Others	Tomatoes	17	FAO
Tomatoes, paste	Others	Others	Tomatoes	84	FAO
Tomatoes, peeled	Others	Others	Tomatoes	19	FAO
Triticale	Cereals (ex rice)	Others	Triticale	327	FAO
Vanilla	Others	Others	Vanilla	288	USDA ¹⁰
Vegetables in vinegar	Others	Others	Vegetables, fresh nes	29	FAO
Vegetables, canned nes	Others	Others	Vegetables, fresh nes	36	FAO
Vegetables, dehydrated	Others	Others	Vegetables, fresh nes	341	FAO
Vegetables, dried nes	Others	Others	Vegetables, fresh nes	176	FAO
Vegetables, fresh nes	Others	Others	Vegetables, fresh nes	22	FAO
Vegetables, fresh or dried products nes	Others	Others	Vegetables, fresh nes	22	FAO
Vegetables, frozen	Others	Others	Vegetables, fresh nes	71	FAO
Vegetables, homogenized preparations	Others	Others	Vegetables, fresh nes	41	FAO
Vegetables, preserved nes	Others	Others	Vegetables, fresh nes	38	FAO
Vegetables, preserved, frozen	Others	Others	Vegetables, fresh nes	22	FAO
Vegetables, temporarily preserved	Others	Others	Vegetables, fresh nes	65	FAO
Vermouths & similar	Others	Others	Grapes	137	FAO
Vetches	Others	Others	Vetches	325	FAO

¹⁰ USDA name: Vanilla extract; USDA Data Type: SR Legacy.

Commodity	Group	El	Primary item	Calories (kcal/100g)	Source
Wafers	Cereals (ex rice)	Others	Cereals, nes	439	FAO
Walnuts, shelled	Others	Others	Walnuts, with shell	642	FAO
Walnuts, with shell	Others	Others	Walnuts, with shell	289	FAO
Watermelons	Others	Others	Watermelons	17	FAO
Wheat	Cereals (ex rice)	Cereals excluding rice	Wheat	334	FAO
Whey, condensed	Milk	Milk, whole fresh cow	Milk, whole fresh cow	26	FAO
Whey, dry	Milk	Milk, whole fresh cow	Milk, whole fresh cow	346	FAO
Wine	Others	Others	Grapes	68	FAO
Yoghurt	Milk	Milk, whole fresh cow	Milk, whole fresh cow	61	FAO
Yoghurt, concentrated or not	Milk	Milk, whole fresh cow	Milk, whole fresh cow	82	FAO